



<http://dx.doi.org/10.11646/phytotaxa.184.5.2>

Dasya patentissima (Ceramiales, Dasyaceae), a new species from the Cabrera Archipelago (Balearic Islands, eastern Spain)

CAROLINA PENA-MARTÍN^{1*}, MANUEL B. CRESPO² & AMELIA GÓMEZ-GARRETA³

¹ Facultad de Ciencias de la Salud, Universidad Autónoma de Chile, Av. Alemania 01090, 4810101 Temuco, Chile.

² CIBIO (Instituto Universitario de la Biodiversidad) & dCARN, Universidad de Alicante, P. O. Box 99, E-03080 Alicante, Spain.

³ Facultat de Farmàcia, Universitat de Barcelona, Avda. Joan XXIII s/n, E-08028 Barcelona, Spain.

*Author for correspondence. e-mail: carolina.pena@uautonoma.cl

Abstract

Morphological studies on the genus *Dasya* (Ceramiales, Rhodophyta) in the western Mediterranean revealed the existence of a collection from the Balearic Islands (eastern Spain) that differed considerably from the known species in the genus. Evidence is provided to regard it as a new species, which here is named *Dasya patentissima*. Affinities and divergences to other Mediterranean species, namely, *D. ocellata* and *D. hutchinsiae*, are discussed and illustrated.

Key words: Ceramiales, Dasyaceae, Morphology, Rhodophyta, Taxonomy, Western Mediterranean

Introduction

The genus *Dasya* C. Agardh (1824: 211) includes red algae with a hairy and delicate appearance and rigid to flaccid texture. According to Pena-Martín *et al.* (2014, and references therein), the thalli are variable in size, up to 30 cm high, and deep red or brownish to purplish-red, with a sympodial branching, polysiphonous, with 4–5 periaxial cells, and more or less strongly corticated. The tetrasporangia are borne in modified axes (stichidia), whorled (4–7 per segment), and the gametophytes are dioecious. The spermatangia, when present, are whorled in monosiphonous axes. Procarps are produced in segments of the sympodial axes. The cystocarps are ostiolate, usually strongly beaked. The genus currently includes over 81 species distributed in sub-polar, temperate and tropical seas (*cf.* Guiry & Guiry 2014), and the revision of Pena-Martín *et al.* (2011a) evidenced the existence of eight species of *Dasya* growing in the west Mediterranean basin (from northwestern Italy and Algeria to the Iberian Peninsula): *D. baillouviana* (S.G. Gmelin 1768: 165) Montagne (1841: 165) (\equiv *Fucus baillouviana* S.G. Gmelin), *D. corymbifera* J. Agardh (1841: 31), *D. hutchinsiae* Harvey (1833: 335–336), *D. ocellata* Harvey (1833: 335) (\equiv *Ceramium ocellatum* Gratel.), *D. rigidula* (Kützing 1843: 415) Ardissonne (1878: 140), *D. rigescens* Zanardini (1865: 388), *D. sessilis* Yamada (1928: 524–526), and *D. patentissima* sp. nov. (here described). Only six of them occur in the Balearic Islands (Pena-Martín, 2011): *D. baillouviana*, *D. hutchinsiae*, *D. ocellata*, *D. patentissima*, *D. rigidula* and *D. rigescens*. Together with *Heterosiphonia* Montagne (1842: 4), it is one of the most widespread genera of the Dasyaceae. However, the taxonomy of *Dasya* is very difficult, and its diversity is still far from being satisfactorily understood. Anatomical and morphological interspecific differences are scarce, and several species show high intraspecific variability (*cf.* Pena-Martín *et al.* 2011a).

In the course of taxonomic studies on the Iberian taxa of *Dasya*, several specimens were collected in June 2005 in the Archipelago of Cabrera (Balearic Islands, E of Spain), on sheltered rocks, namely, in the northern part of Punta d'Ensiola (Cabrera Gran Island). Most of these specimens belonged to *D. hutchinsiae* and *D. ocellata*. However, a small peculiar plant was found among specimens of the two other species, which showed well developed stichidia and cystocarps. After detailed studies, assignment was not possible to any of the described species of *Dasya*. Therefore, evidence is here presented to describe it as a new species.

filaments, the smaller stichidia (125–325 × 45–90 µm), the contiguous (not separated) cover cells, and the smaller pericaps (350–500 × 320–450 µm) (Table 1). From *D. hutchinsiae*, it is recognisable by the presence of adventitious branches, the complete cortication of thalli, the periaxial cells indistinguishable at the base, the narrower (15–25 µm) fifth apical cell of ramuli, the apical position of cystocarps, and the carpospores elongated in outline (Table 1).

Although the type specimen of *Dasya patentissima* might be regarded as an atypical individual of *D. ocellata* or *D. hutchinsiae*, the fact that it is reproductive, all the morphological characters are constant through the thallus, and no aberrant specimens of both above cited species are known, allows us to rule out this possibility. Furthermore, the eventual inclusion of this specimen within the variation range of any of those two species would create a great distortion of the current taxonomic circumscription of both taxa (Pena-Martín 2011). All those reasons justify in our opinion the description of a new species.

Nonetheless, new collections of *D. patentissima* are necessary to undertake genetic analyses that will help to establish its taxonomic position and phylogenetic relationships. Two collecting attempts during the last years to find new localities of *D. patentissima* were unsuccessful to date. In the meantime, and due to the small amount of available original material, no DNA extraction was made to preserve the holotype.

So far, the available molecular papers that include *Dasya* species are focused on phylogenetic relationships within Florideophyceae, Ceramiales or some families close to Dasyaceae (cfr. Saunders & Bailey 1997; Jong *et al.* 1998; Choi *et al.* 2002, 2008; Kapraun & Dunwoody 2002), the sequences of *Dasya* they refer being only partial. Recently, Yamagishi *et al.* (2014) have reported a phylogenetic study on *Dasya* species from Japan, based mostly on the same data taken from GeneBank. Therefore, to date no comprehensive molecular studies are found allowing a proper discussion on phylogenetic relationships within the genus *Dasya*. Nonetheless, a preliminary phylogeny inferred from *rbcL* sequences (cpDNA) and morphological data including the west Mediterranean taxa of *Dasya* is underway.

Acknowledgements

Sincere thanks go to M. Martínez-Azorín for kindly providing the original material. The curators of the herbaria cited in the text are also acknowledged for the loan of *Dasya* material. Two anonymous referees made valuable suggestions that improved the text. The director and staff of Parque Nacional Marítimo-Terrestre del Archipiélago de Cabrera (Spanish Government) facilitated permissions that made possible this research. Financial support was partly obtained from the project MAM039/2002 (M° de Medio Ambiente, Spanish Government).

References

- Abbott, I.A. (1999) *Marine red algae of the Hawaiian Islands*. Bishop Museum Press, Honolulu, 47 pp.
- Adams, N.M. (1994) *Seaweeds of New Zealand. An Illustrated Guide*. Canterbury University Press, Christchurch, 360 pp.
- Agardh, C.A. (1824) *Systema Algarum*. Literis Berlingianis, Lund, 312 pp.
<http://dx.doi.org/10.5962/bhl.title.1829>
- Agardh, J.G. (1841) In historia algarum symbolae. *Linnaea* 15: 1–50.
- Ardissone, F. (1878) *Le Floridee italiane descritte ed illustrate. 8, Rhodomelaceae*. Tipografia editrice Lombarda, Milano, 119 pp., 4 pls.
- Ballantine, D.L. (2000) *Dasya magnei* sp. nov. (Dasyaceae, Rhodophyta) from the Caribbean Sea. *Cryptogamie Algologie* 21: 149–155.
[http://dx.doi.org/10.1016/S0181-1568\(00\)00108-2](http://dx.doi.org/10.1016/S0181-1568(00)00108-2)
- Ballantine, D.L. & Aponte, N.E. (2004) *Dasya abbottiana* sp. nov. (Dasyaceae, Rhodophyta) from Puerto Rico, Caribbean Sea. *Cryptogamie Algologie* 25: 409–417.
- Choi, H.G., Kraft, G.T., Lee, I.K. & Saunders, G.W. (2002) Phylogenetic analyses of anatomical and nuclear SSU rDNA sequence data indicate that the Dasyaceae and Delesseriaceae (Ceramiales, Rhodophyta) are polyphyletic. *European Journal of Phycology* 37: 551–569.
<http://dx.doi.org/10.1017/S0967026202003967>
- Choi, H.G., Kraft, G.T., Kim, H.S., Guiry, M. & Saunders, G.W. (2008) Phylogenetic relationships among lineages of the Ceramiales (Ceramiales, Rhodophyta) based on nuclear small subunit rDNA sequence data. *Journal of Phycology* 44: 1033–1048.
<http://dx.doi.org/10.1111/j.1529-8817.2008.00554.x>
- Ellis, J. & Solander, D. (1786) *The natural history of many curious and uncommon zoophytes, collected from various parts of the globe by the late John Ellis*. B. White & Son, London, 208 pp.
- Fredericq, S. & Norris, J.N. (1986) The structure and reproduction of *Dasya haitiana* sp. nov. (Dasyaceae, Rhodophyta) from the Caribbean Sea. *Phycologia* 25: 185–196.
<http://dx.doi.org/10.2216/i0031-8884-25-2-185.1>
- Gmelin, S.G. (1768) *Historia fucorum*. Typographia Academiae scientiarum, Saint Petersburg, 239 pp.
- Grateloup, J.P.A.S. (1806) *Observations sur la constitution de l'été de 1806 SS. Descriptions Aliquorum ceramiorum novorum, cum*

iconum explicationibus. Montpellier.

- Guiry, M.D. & Guiry, G.M. (2014) *AlgaeBase*. World-wide electronic publication, National University of Ireland, Galway. Available from: <http://www.algaebase.org> (accessed July 2014).
- Harvey, W.H. (1833) Div. II. Confervoideae. In: Hooker, W.J. (Ed.) *The English Flora of Sir James Edward Smith. Class XXIV. Cryptogamia. Vol. V. (or Vol. II of Dr Hooker's British Flora). Part I, comprising the Mosses, Hepaticae, Lichens, Characeae and Algae*. Longman, Brown, Green & Longmans Paternoster-Row, London, pp. 322–385.
- Harvey, W.H. (1844) Algae of Tasmania. *London Journal of Botany* 3: 428–454.
- Harvey, W.H. (1849) *Phycologia Britannica* 2(1). Reeve and Benham, London, plates 98–189.
- Jadiye, S.U. & Rao, P.S.N. (2007) A new species of *Dasya* (Rhodophyta, Ceramiales) from the Dapoli coast of Maharashtra, India. *Feddes Repertorium* 118: 60–64.
<http://dx.doi.org/10.1002/fedr.200611127>
- Jong, Y.S.D.M. de, Prud'homme van Reine, W.F. & Lokhorst, G.M. (1997) Studies on *Dasyaceae*. 2. A revision of the genera *Eupogodon* and *Dipterocladia* gen. nov. (Ceramiales, Rhodophyta). *Botanica Marina* 40: 421–450.
<http://dx.doi.org/10.1515/botm.1997.40.1-6.421>
- Jong, Y.S.D.M. De, Van Der Wurff, A.G., Stam, W.T. & Olsen, J. (1998) Studies on *Dasyaceae*. 3. Towards a phylogeny of the *Dasyaceae* (Ceramiales, Rhodophyta), based on comparative rbcL gene sequences and morphology. *European Journal of Phycology* 33: 187–201.
- Kapraun, D.F. & Dunwoody, J.T. (2002) Relationship of nuclear genome size to some reproductive cell parameters in the Florideophycidae (Rhodophyta). *Phycologia* 41: 507–516.
<http://dx.doi.org/10.2216/i0031-8884-41-5-507.1>
- Kützing, F.T. (1843) *Phycologia generalis; oder Anatomie, Physiologie und Systemkunde der Tange, part 2*. F.A. Brockhaus, Leipzig, pp. 143–458.
- Linnaeus, C. (1753) *Species plantarum*. Laurentii Salvii, Stockholm, 1200 pp.
- López-Piñero, I.Y. & Ballantine, D.L. (2001) *Dasya puertoricensis* sp. nov. (*Dasyaceae*, *Rhodophyta*) from Puerto Rico, Caribbean Sea. *Botanica Marina* 44: 337–344.
<http://dx.doi.org/10.1515/BOT.2001.043>
- Masuda, M., Uwai, S., Kogame, K., Kawaguchi, S. & Phang, S.M. (2003) Taxonomic notes on marine algae from Malaysia. X. Four species of *Dasya* (Rhodophyceae), with the descriptions of *Dasya longifila* sp. nov. and *D. malaccensis* sp. nov. *Botanica Marina* 46: 243–255.
<http://dx.doi.org/10.1515/BOT.2003.022>
- Masuda, M., Kurihara, A. & Kogame, K. (2007) Two species of *Dasya* (Ceramiales, Rhodophyta) from Bonin Islands, Southern Japan, with the description of *Dasya boninensis* sp. nov. *Phycological Research* 55: 113–124.
<http://dx.doi.org/10.1111/j.1440-1835.2007.00454.x>
- Millar, A.J.K. (1990) Marine red algae of the Coffs Harbour region, northern New South Wales. *Australian Systematic Botany* 3: 293–593.
<http://dx.doi.org/10.1071/SB9900293>
- Millar, A.J.K. (1996) *Dasya roslyniae* sp. nov. (*Dasyaceae*, *Rhodophyta*), with a discussion on generic distinctions among *Dasya*, *Eupogodon*, *Rhodoptilum*, and *Pogonophorella*. *Journal of Phycology* 32: 145–157.
<http://dx.doi.org/10.1111/j.0022-3646.1996.00145.x>
- Montagne, J.F.C. (1841) Plantes cellulaires. In: Webb, P.B. & Berthelot, S. (Eds.) *Histoire naturelle des Iles Canaries. Tome troisième. Deuxième partie: Phytographie canariensis. Sectio ultima*. Béthune, Paris, pp. 161–208.
<http://dx.doi.org/10.5962/bhl.title.60795>
- Montagne, J.F.C. (1842) *Prodromus generum specierumque phycearum novarum*. Gide editorem, Paris, 12 pp.
- Pena-Martín, C., Gómez-Garreta, & Crespo, M. B. (2007). Proposal to conserve *Fucus baillouviana* (*Dasyaceae*, *Rhodophyta*). *Taxon* 56: 253–254.
- Pena-Martín, C. (2011) El género *Dasya* (Rhodophyta, *Dasyaceae*) en la península Ibérica y las islas Baleares: revisión taxonómica y nomenclatural. PhD Thesis Collection, University of Alicante, Alicante, 299 pp.
<http://hdl.handle.net/10045/20535>
- Pena-Martín, C., Le Gall, L., Crespo, M.B. & Gómez-Garreta, A. (2011a) A revision of *Dasya* C. Agardh (*Dasyaceae*, *Rhodophyta*) in the western Mediterranean basin. *5th European Phycological Congress*. 4–9 September. Rhodes, Greece.
- Pena-Martín, C., Verlaque, M., Crespo, M.B. & Gómez-Garreta, A. (2011b) Morphology and taxonomic status of *Dasya rigescens* (Rhodophyta, *Dasyaceae*). *Cryptogamie Algologie* 32: 63–76.
<http://dx.doi.org/10.7872/crya.v32.iss1.2011.063>
- Pena-Martín, C., Crespo, M.B. & Gómez-Garreta, A. (2014) Nomenclatural remarks and typification of *Dasya* species (*Dasyaceae*, *Rhodophyta*) from the western Mediterranean. *Nordic Journal of Botany* 32: 196–208.
<http://dx.doi.org/10.1111/j.1756-1051.2012.01510.x>
- Peña, V. & Bárbara, I. (2006) Revision of the genus *Dasya* (Ceramiales, *Rhodophyta*) in Galicia (NW Spain) and the addition of a new alien species *Dasya sessilis* Yamada for the European Atlantic coasts. *Anales del Jardín Botánico de Madrid* 63: 13–26.
- Saunders, G.W. & Bailey, J.C. (1997) Phylogenesis of pit-plug-associated features in the *Rhodophyta*: inferences from molecular systematic data. *Canadian Journal of Botany* 75: 1436–1447.
<http://dx.doi.org/10.1139/b97-858>
- Sauvageau, C. (1904) *Remarques sur les Sphacélariacées* 2. Féret et fils, Bordeaux, 160 pp.
- Sonder, G. (1845) Nova algarum genera et species, quas in itinere ad oras occidentales Novae Hollandiae, collegit L. Priess, Ph. Dr. *Botanische Zeitung* 3: 49–57.
- Stegenga, H., Bolton, J.J. & Anderson, R.J. (1997) *Seaweeds of the South African West Coast. [Contributions from the Bolus Herbarium 8]*. University of Cape Town, Rondebosch, 655 pp.

- Taylor, W.R. (1960) *Marine algae of the eastern tropical and subtropical coasts of the Americas*. University of Michigan Press, Michigan, pp. 555–807.
- Thiers, B. (2014) Index Herbariorum: a global directory of public herbaria and associated staff. Available from: <http://sweetgum.nybg.org/ih/> (accessed July 2014).
- Womersley, H.B.S. (1998) *The marine benthic flora of Southern Australia. Part III C. Ceramiales: Ceramiaceae, Dasyaceae*. Australian Biological Resources Study & State Herbarium of South Australia, Canberra & Adelaide, 535 pp.
- Yamada, Y. (1928) Report on the biological survey of Mutsu Bay, 9. Marine algae of Mutsu Bay and adjacent waters. II. *Scientific Reports of the Tôhoku Imperial University 4, Biology Series 3*: 497–534.
- Yamagishi, Y., Ohta, Y., Masuda, M. & Abe, T. (2014) *Dasya enomotoi* sp. nov. (Dasyaceae, Ceramiales), a new large *Dasya* from Japan. *Phycological Research* 62: 63–72.
<http://dx.doi.org/10.1111/pre.12038>
- Zanardini, G. (1840) Sopra le alghe del Mare Adriatico. Lettera seconda di Giovanni Zanardini, medico fisico in Venezia, alla Direzione della Biblioteca Italiana. *Biblioteca Italiana Ossia Giornale di Letteratura Scienze ed Arti (Milano)* 99: 195–229.
- Zanardini, G. (1841) Synopsis algarum in mari Adriatico hucusque collectarum, cui accedunt monographia siphonearum nec non generales de algarum vita et structura disquisitiones cum tabulis auctoris manu ad vivum depictis. *Memorie della Reale Accademia delle Scienze di Torino, ser. 2* 4: 105–255.
- Zanardini, G. (1865) Scelta di Ficee nuove o più rare dei mari Mediterraneo ed Adriatico. Decade VI. *Memorie del Reale Istituto Veneto di Scienze, Lettere ed Arti* 12(2): 375–410.